UNITED STATES PATENT AND TRADEMARK OFFICE

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10/802,428	03/17/2004	Bin Zhang	200314385-1	3515

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EXAMINER
WERNER, DAVID N

ART UNIT	PAPER NUMBER
2621	

NOTIFICATION DATE	DELIVERY MODE
02/04/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _03 November 2008_.
2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-3,5-15,17-25,27 and 29_ is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) _1-3,5-15,17-25,27 and 29_ is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on _17 March 2004_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All   b)☐ Some * c)☐ None of:
      1.☐ Certified copies of the priority documents have been received.
      2.☐ Certified copies of the priority documents have been received in Application No. _____.
      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.
4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application
6)☐ Other: _____.

DETAILED ACTION

1.   This Office action for U.S. Patent Application 10/802,428 is responsive to the

Appeal Brief filed 20 November 2008. Currently, claims 1–3, 5–15, 17–25, 27, and 29

are pending.

2.   In the previous Office action, claims 1–3 and 5–12 were rejected under 35 U.S.C.

101 as non-statutory. Claims 1–3, 5–7, 10–15, 17–19, and 22–25 were rejected under

35 U.S.C. 103(a) as obvious over "Motion-based Segmentation Using a Thresholded

Merging Strategy on Watershed Segments" (de Smet et al.) in view of "K-Harmonic

Means–A Data Clustering Algorithm" (Zhang et al.). Claims 8, 9, 20, and 21 were

rejected under 35 U.S.C. 103(a) as obvious over de Smet et al. in view of Zhang et al.

and in view of "A Video Segmentation Algorithm for Hierarchical Object Representations

and its Implementation" (Herrmann et al.). Claims 27 and 29 were rejected under 35

U.S.C. 103(a) as obvious over de Smet et al. in view of Zhang et al., and in view of US

Patent 6,084,912 A (Reitmeier et al.).

3.   In view of the Appeal Brief filed on 20 November 2008, PROSECUTION IS

HEREBY REOPENED. New grounds of rejection under 35 U.S.C. section 101 are set

forth below.

        To avoid abandonment of the application, appellant must exercise one of the

following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply

under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed

by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and

appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth

in 37 CFR 41.20 have been increased since they were previously paid, then appellant

must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by

signing below:

/Mehrdad Dastouri/

Supervisory Patent Examiner, Art Unit 2621.

Response to Arguments

4.   Applicant's arguments filed with respect to the rejection of claims 1–3 and 5–12

under 35 U.S.C. 101 as non-statutory have been fully considered but they are not

persuasive. The examiner respectfully disagrees with Applicant's assessment that the

claimed "program storage device" does not encompass the non-statutory embodiments

described in the specification. The specification in paragraph 0088 states that the

process is "embodied in a process-readable medium or carrier, e.g. one or more of the

fixed and/or removable data storage devices 588 illustrated in Fig. 5, or other data

storage or data communications devices". This language implies that both the

"processor-readable medium" and the "carrier" embody the "fixed and/or removable

data storage devices", the "other data storage", and the "data communications devices".
Although the data storage device 588 is shown in figure 5 to be embodied as a statutory
floppy disk, the term "other data storage" may encompass both statutory and non-
statutory embodiments.

Applicant additionally states that applying *Nuijten* to claim 1 was improper, since
Nuijten held a "storage medium having stored thereon a signal with embedded
supplemental data" to be statutory (pg. 1498). However, in the specification of
application 09/211,928, the only storage medium described therein was an optical disc
according to the DVD-Audio specification (pg. 2: line 18; pg. 6: line 13). Then, the
"storage medium" in claim 15 was only described in a statutory embodiment. This
differs from the present invention, in which the claimed "program storage device" itself is
not limited to the "data storage device 588". Accordingly, the narrow interpretation of
Nuijten as only relevant to a claimed signal *per se* and not the claimed "program storage
device" is improper due to the broader recitation of storage media in the present
application than in the *Nuijten* application.

5.   Applicant's arguments filed with respect to the rejection of claim 1 under 35
U.S.C. 103(a) as obvious over de Smet et al. and Zhang et al. have been fully
considered but they are not persuasive. Applicant makes two arguments: first, that the
present invention performs multiple K regression functions, whereas the Zhang
reference discloses a single performance function, and second, that it was improper to
combine the De Smet and Zhang references.

Regarding the allegation that the present invention differs from the Zhang reference, it is respectfully submitted that in Zhang, the recursive formula for m(k) is performed for K values of m (page 5), where K is the number of centers. This formula, in turn, includes factors of distance d and location of data point x. Generally speaking, a regression function is a function Y=f(X,Z), where Y is a dependent variable, X is an independent variable, and Z is an unknown error or residual variable. In Zhang, then, the calculation of m is a regression function, based on independent variable x and residual variable d. Since the function for determining m is performed K times, it is respectfully submitted that Zhang discloses multiple regression functions, one for each of K centers m.

Regarding the allegation that the combination of the two references was improper, the appeal brief states, "There is no apparent evidence that De Smet teaches a center-based approach for obtaining a motion-based segmentation of an image sequence" (pg. 11), and "De Smet's segmentation method does not use centers" (pg. 12). However, the appeal brief also states in page 9 that "De Smet teaches using a direct K-means (KM) cluster algorithm" which is then described as "a center-based iterative algorithm that refines the clusters defined by K centers". Therefore, the argument that it would be improper to apply the "center-based clustering" of ZHM (pg. 12) to de Smet is based on a contradiction, and thus invalid.

Claim Rejections - 35 USC § 101

6.   35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

7.   Claims 1–3, 5–12, and 25 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 1–3 and 5–12 are drawn to a "program storage device" storing functional descriptive material. Normally, the claims would be statutory. *In re Nuijten*, 84 USPQ2d 1495, 1498) (Fed. Cir. 2007). However, the specification, at page 0088, defines the claimed storage as encompassing statutory material such as a floppy disk, as well as non-statutory subject matter as a "carrier" or "communications devices". A signal embodying functional descriptive material is neither a process nor a product (i.e., a tangible "thing"), and therefore does not fall within one of the statutory classes of §101. Rather, a "signal" is a form of energy, in the absence of any physical structure or tangible material. *Id.* at 1500.

Regarding claim 25, Supreme Court precedent[1] and recent Federal Circuit decisions[2] indicate that a statutory "process" under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. While the instant claim(s) recite a series of steps or acts to be performed, the claims neither transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory

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[1] *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 US 780, 787-88 (1876).
[2] *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

process. In the present invention, method claim 25 does not state what performs the

claimed method steps of providing data points and performing regression clustering.

Claim Rejections - 35 USC § 103

8.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

9.   Claims 1–3, 5–7, 10–15, 17–19, and 22–25 are rejected under 35 U.S.C. 103(a)

as being unpatentable over "Motion-based Segmentation Using a Thresholded Merging

Strategy on Watershed Segments" (de Smet et al.) in view of "K-Harmonic Means–A

Data Clustering Algorithm" (Zhang et al.). De Smet et al. discloses using an iterative

segment-merging technique to determine information for an image (abstract).

Regarding claims 1, 13, and 25, in de Smet et al., an initial motion field is first

determined with a block-matching technique on 4 x 4 blocks (§ 2.1). These initial block

motion vectors are used for the initial segmentation (§ 2.3). Then, the step of

performing the block-based motion estimation is the claimed step of "providing data

points". Next, the segments are iteratively merged according to similar or shared

motion, according to the K-means clustering algorithm (§ 2.3). This is the claimed step

of "clustering the data points". When this process is finished, the result is a series of

large segments corresponding to distinct moving regions of an image, each with an

associated motion vector (§ 2.3). This is the claimed step of "providing motion

estimation". However, the present invention specifies performing regression clustering according to a K-Harmonic Means function, which is not the same as the K-means function of de Smet et al.

Zhang et al. discloses the K-Harmonic Means data clustering algorithm. Regarding claim 1, 3, and 25, Zhang et al. teaches selecting K centers m(l) from N data points x(i) (pg. 1), initializing center points (pg. 2) and performing an initial iteration (pg. 5), calculating distance d(i,l) between data point x(i) and center point m(l) (pg. 4), calculating membership probability q(i,k) and weighting function p(i,k) (pg. 5), recursively calculating new m(k), (pg. 5), and stopping when the recursively-calculated performance value stabilizes, that is, when its change with each iteration becomes small (pg. 5). Then, the K calculations of centers m(l) are the claimed "regression functions" for performing regression clustering according to the K-harmonic means function.

De Smet et al. discloses the claimed invention, except for using K-Harmonic Means function to perform regression clustering. Zhang et al. teaches that it was known to perform data clustering with the K-Harmonic means function. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to perform clustering based on a K-Harmonic means function, as taught by Zhang et al., rather than a linear function such as the K-means function of de Smet et al., since Zhang et al. states in the abstract that K-harmonic clustering is less sensitive to detrimental effects from sub-optimal initialization than conventional clustering techniques. Additionally, the K-harmonic means function was specifically designed as an improved version of the K-means function, which "significantly improves the quality

of clustering results" compared with K-means (abstract). Then, the de Smet et al. algorithm contains a basic method which the present invention is an improvement thereof. The prior art Zhang et al. describes a known technique, the K-Harmonic means clustering algorithm, applicable to the base segmentation method of de Smet et al., by substituting it for the K-means algorithm. Then, one having ordinary skill in the art would have recognized that applying the K-harmonic means algorithm of Zhang et al. to de Smet et al. would have yielded the predictable result of "significantly [improved] quality of clustering results" and resulted in an improved system. Therefore, it is respectfully submitted that the use of K-harmonic clustering in de Smet et al. is considered obvious, since it has been held that applying a known technique to a known method ready for improvement to yield predictable results involves only routine skill in the art. *Dann v. Johnston*, 425 U.S. 219, 230, 189 USPQ 257, 261 (1976); *In re Nilssen*, 851 F.2d 1401, 1403, 7 USPQ2d 1500, 1502 (Fed. Cir. 1988).

Regarding claims 2, 3, 14, and 15, as previously mentioned, de Smet et al. produces a motion vector for each segment in an image (§ 2.3). As a result, the most important moving areas are determined (§ 3). Regarding claims 10 and 22, in de Smet et al., pixels are set as (x,y,t) triples, with x and y as spatial coordinates and t as a time coordinate (§ 2.2).

Regarding claims 11 and 23, de Smet et al. illustrates motion fields (figures 3-6). Although these motion fields are not shown as overlaid on the images, the examiner takes Official Notice that it was well-known in the art at the time of the invention to

display a motion field superimposed on an image to provide a visual representation of motion vectors.

Regarding claims 12 and 24, de Smet et al. illustrates highlighted motion segments overlaid on an image (figures 11 and 12).

Regarding claims 5 and 17, in Zhang et al., a clustering in which initialization is randomized is described (pg. 11).

Regarding claims 6 and 18, in Zhang et al., KHM is described as a recursive function that performs until stabilization is achieved (pg. 5).

Regarding claims 7 and 19, insensitivity to initialization is an inherent result of the K-Harmonic means algorithm (abstract).

10.   Claims 8, 9, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over de Smet et al. in view of Zhang et al. as applied to claims 1 and 13 above, and further in view of "A Video Segmentation Algorithm for Hierarchical Object Representations and its Implementation" (Herrmann et al.). Claims 8, 9, 20, and 21 disclose using color information to segment images, but de Smet et al. only discloses "standard watershed techniques" (§ 2.2) to perform the initial segmentation without providing details.

Herrmann et al. discloses a method for image segmentation to extract objects from a moving image. Regarding claims 8, 9, 20, and 21, after an initial block-matching motion estimation, similar to de Smet et al., images are segmented according to specific color information, followed by shape analysis, and lastly motion analysis to merge

regions to determine objects (§ II). This color, shape, and motion information form the claimed "predetermined criteria". In color analysis, a region is determined as homogeneous if the pixel difference in the region is below a threshold. Homogenous, connected areas are determined as "quasi-flat zones". These quasi-flat zones are further processed and become the basis for further segmentation (§ II.B). Then, the color analysis is the claimed step of "portioning data according to color".

De Smet et al., in combination with Zhang et al., disclose a majority of the features of claims 8, 9, 20, and 21 as discussed above, the claimed invention except for color segmentation. Herrmann et al. teaches that it was known to segment a moving image according to color. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to determine image segmentation by color as taught by Herrmann et al., since Herrmann et al. teaches in page 205, third paragraph, that color analysis produces the most accurate type of segmentation.

11.   Claims 27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over de Smet et al. in view of Zhang et al., and in view of US Patent 6,084,912 A (Reitmeier et al.) Claims 27 and 29 are in means-plus-function format, complying with 35 U.S.C. 112, sixth paragraph. Accordingly, the "system" of claims 27 and 29 will be limited to a general-purpose computer such as a PC, as illustrated in figure 5 of the specification of the present invention. Although it is implied that the algorithms of de Smet et al. and Zhang et al. are computer-operated, neither de Smet et al. nor Zhang et al. explicitly teach this.

Reitmeier et al. discloses a video encoder. This encoder may operate on MPEG-4 video (column 1: line 57), as specified in paragraphs [0006] and [0007] of the present invention as a codec on which the present invention is applied. Regarding claim 27, the encoder of Reitmeier et al. may operate as a software application on a general-purpose computer (column 2: lines 64-67). Regarding claim 29, Reitmeier et al. discloses frame memory 155, which stores decoded reference frames for motion compensation (column 7: line 27), as is well-known in MPEG encoders.

De Smet et al., combined with Zhang et al., discloses the claimed invention except for encoding video on a general-purpose computer. Reitmeier et al. teaches that it was known to implement an MPEG-4 encoder as software embedded on a computer. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to encode the system of de Smet et al. and Zhang et al. in a software MPEG encoder embedded on a computer, as taught by Reitmeier et al., in order to perform computationally complex functions such as motion compensation, quantization, and variable-length encoding inherent in the video coding process.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David N. Werner whose telephone number is (571)272-9662. The examiner can normally be reached on Monday-Friday from 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on (571) 272-7418. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. N. W./
Examiner, Art Unit 2621

/Mehrdad Dastouri/
Supervisory Patent Examiner, Art Unit 2621